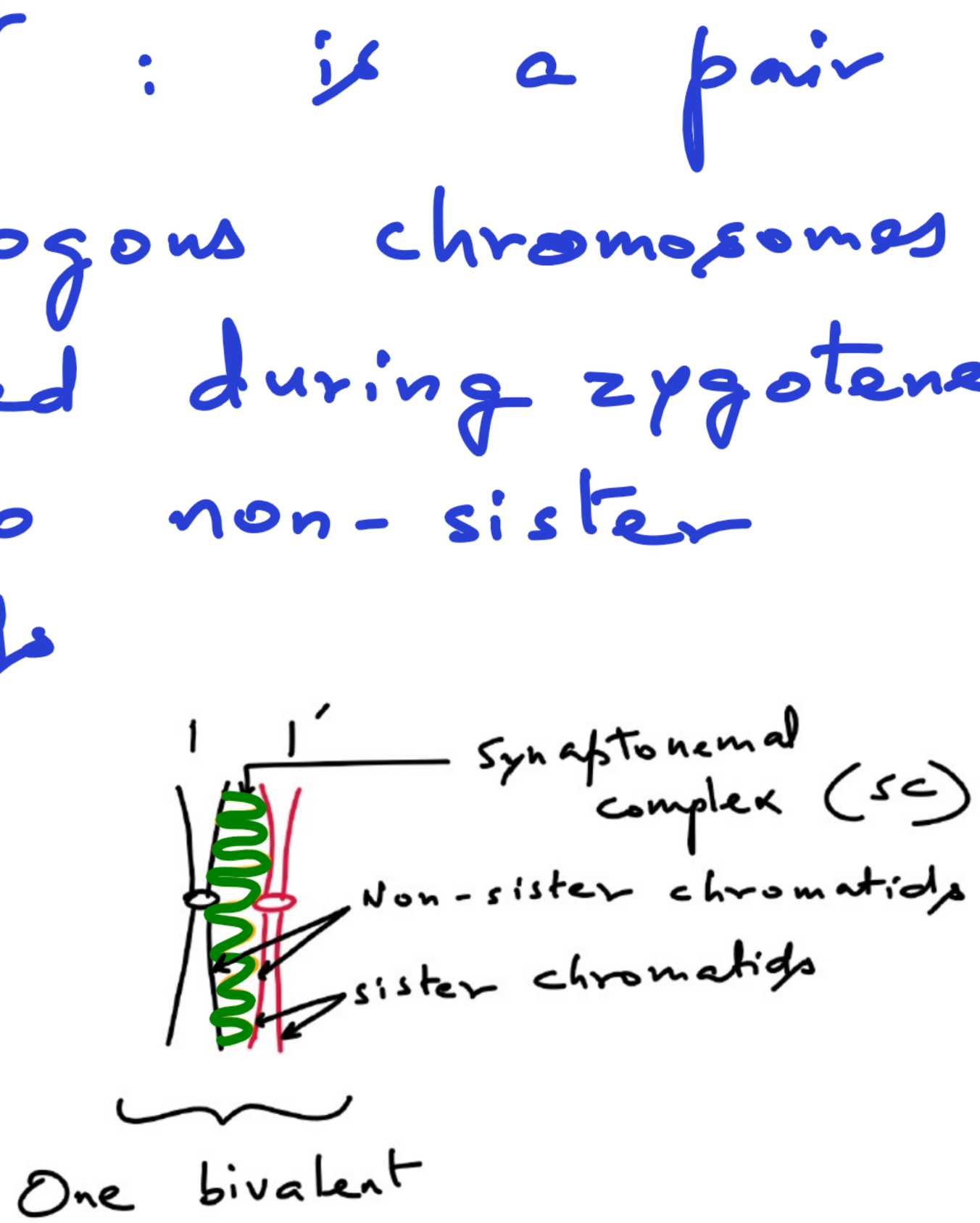
NOTE:

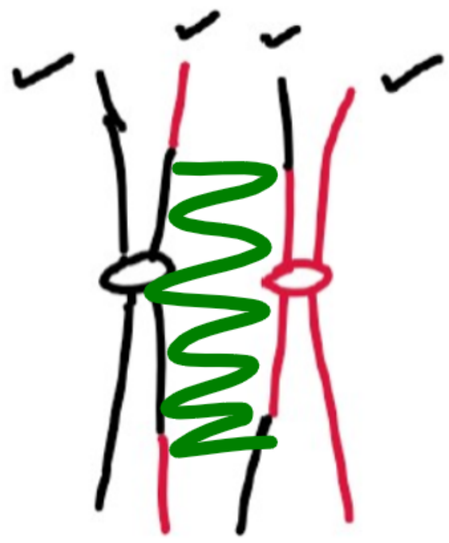
① Homologous chromosomes:

These are a set of one maternal and one paternal chromosomes which have the same linear sequence of genes.

② A bivalent: is a pair of homologous chromosomes and formed during zygotene. Here two non-sister chromatids remain paired.

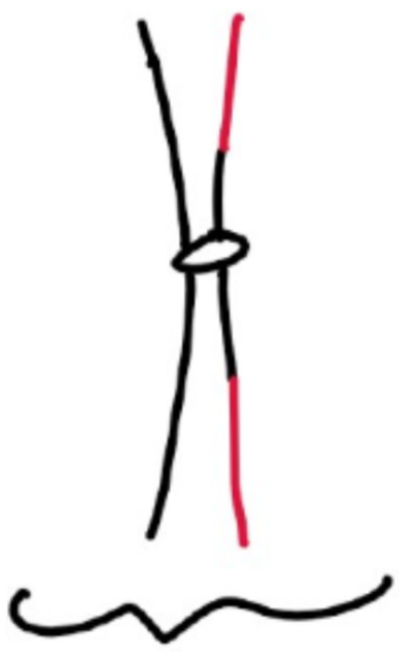


③ A tetrad : is a pair of homologous chromosomes with four visible chromatids and can be observed during pachytene.



[One tetrad]

④ A dyad : is one chromosome with two chromatids



One dyad

⑤ A monad : is one chromosome with one chromatid.

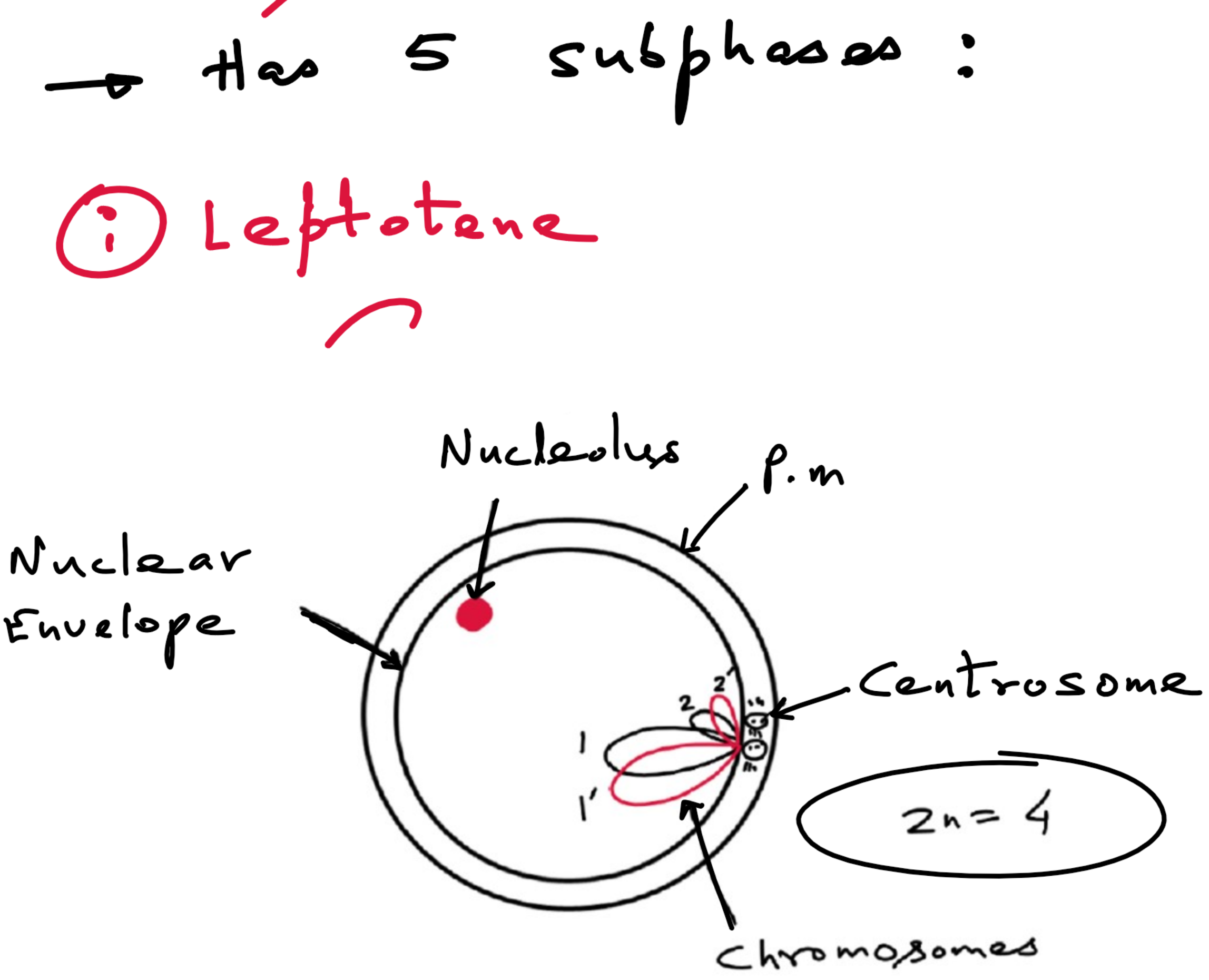
(one monad)

MEIOSIS - I

PROPHASE - I

→ has 5 subphases :

① Leptotene

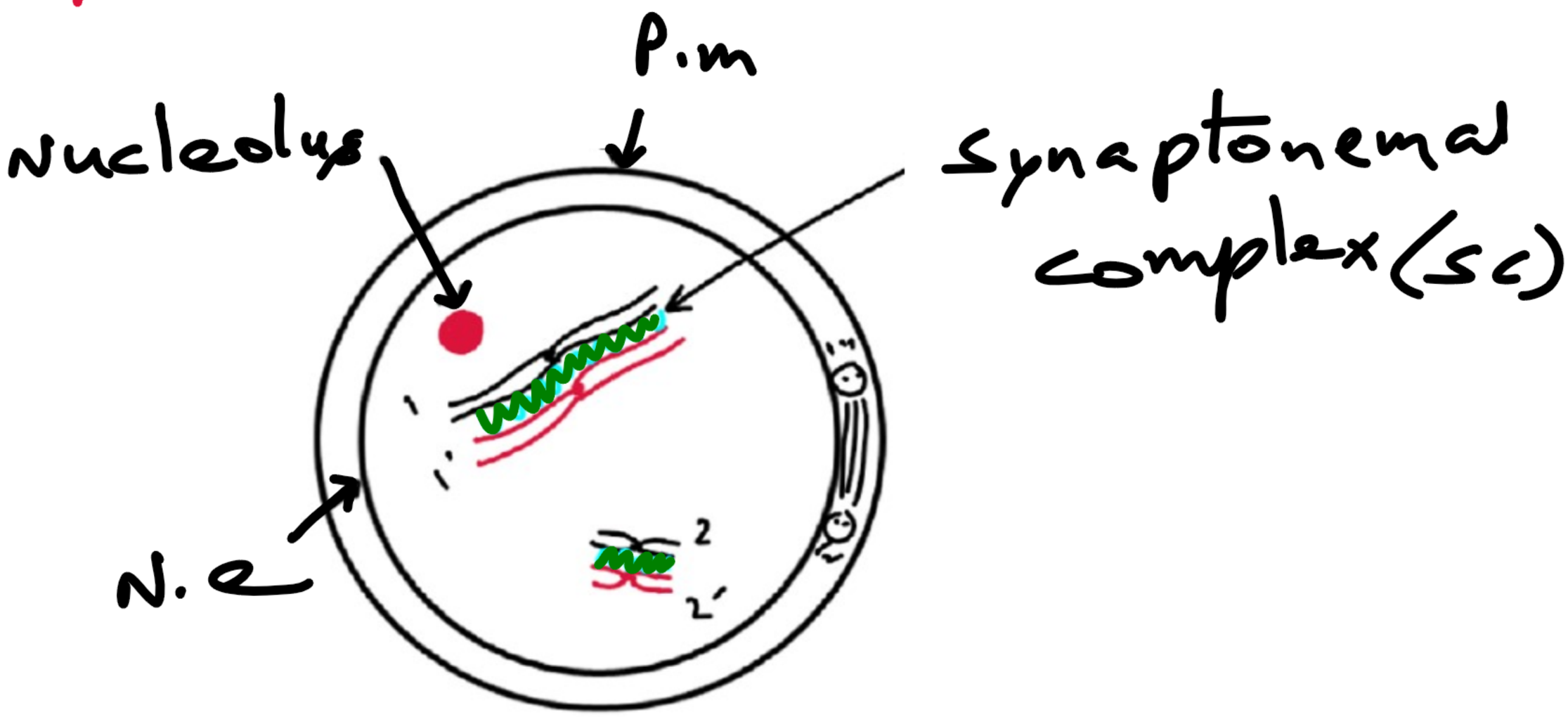


→ Chromosome gradually becomes visible

→ Chromosome compaction continues

→ Nuclear envelope and nucleolus are visible.

(ii) Zygotene



→ The homologous chromosomes start to pair and this pairing process is called **synapsis**.

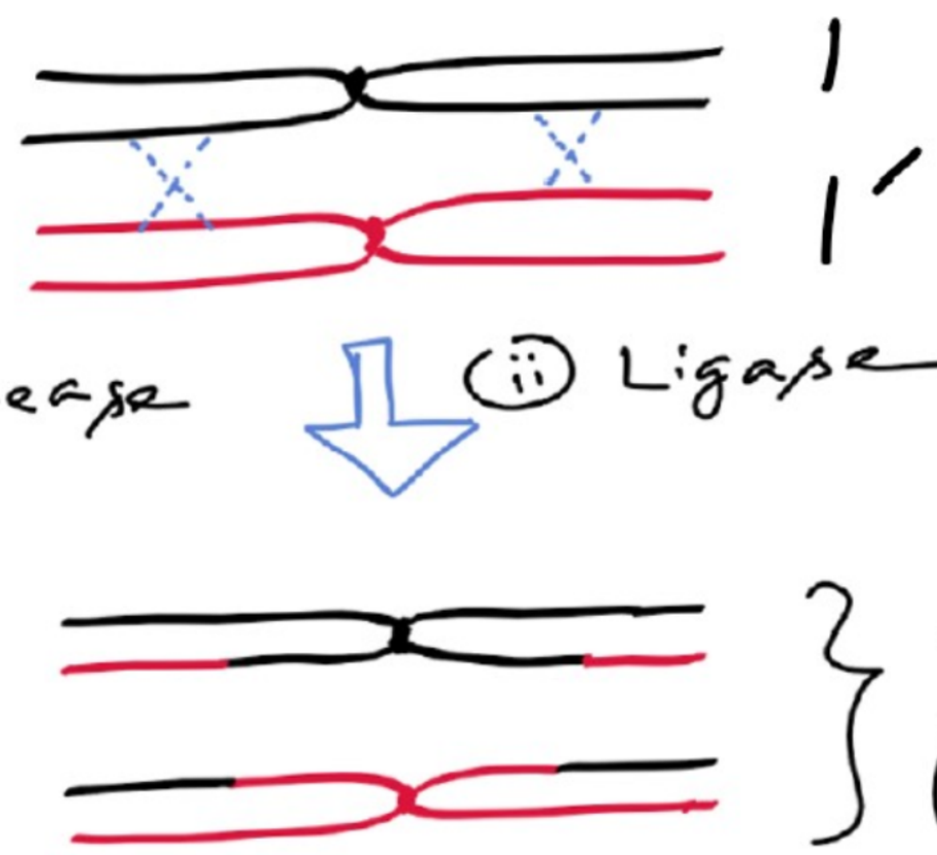
→ Synapsis occurs with the help of a ribonucleoprotein called **synaptonemal Complex**.

→ The complex formed by a pair of homologous chromosomes is called a **bivalent** which

during pachytene becomes available as tetrad.

→ The no. of bivalents is half the total no. of chromosomes.

(iii) Pachytene



→ The four chromatids of each bivalent become distinct and clearly appear as tetrad.

→ The stage is characterised by the appearance of Recombination Nodules (part of 'SC') at the sites where crossing-over will occur.

→ Recombination nodule posses Recombinase enzyme (Endonuclease + Ligase).

→ Crossing-over occurs which leads to recombination of genetic material on the two chromosomes.

→ Crossing over & recombination leads to the genetic variation in the future offsprings.

(iv) Diplotene

→ 'sc' dissolves

→ The site of cross-over appear 'X-shaped' called chiasmata

→ Due to dissolving of 'sc', the tendency of recombined homologous chromosomes of the bivalents to separate from each other occurs.

→ In the primary oocytes of some vertebrates, diplotene lasts for months or years and is specially called DICTYOTENE.

(v) Diakinesis

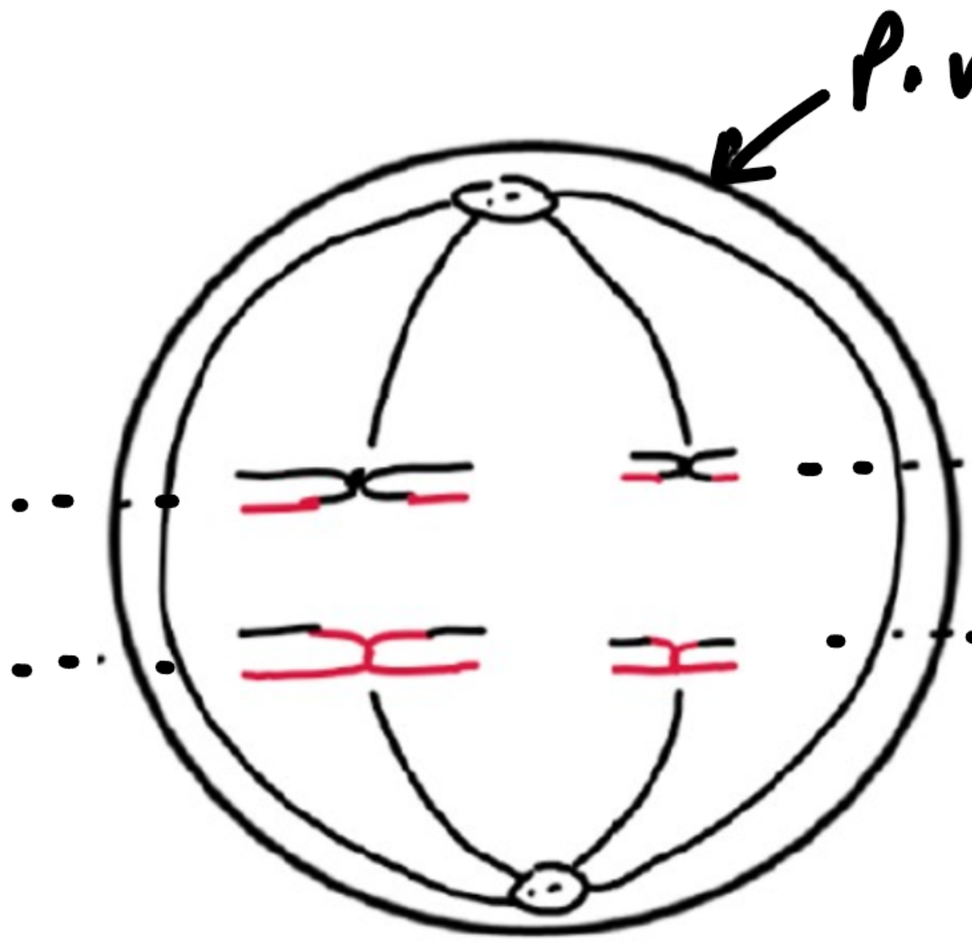
→ Terminalisation of chiasmata occurs i.e., disappearance of chiasmata towards the telomeric region.

→ Chromosomes are fully condensed and the meiotic spindle is assembled to prepare the homologous chromosomes for separation.

→ By the end of diakinesis, nuclear envelope and nucleolus disappear.

→ Diakinesis represents the transition to Metaphase-I.

METAPHAS - I



→ Nuclear envelope and nucleolus disintegrates completely

→ The bivalent chromosomes align themselves on two equatorial plates. The micro-tubules from the opposite poles of spindle attach to the pair of homologous chromosomes. Each chromosome has two chromatids.

→ The distribution of bivalent chromosomes are very random. These get randomly arranged on two equatorial plates.

ANAPHASE-I

→ The homologous chromosomes separate. This process of separation is called disjunction.

→ Each chromosome possess two chromatids. (But during mitotic anaphase, each chromosome possess one chromatid)

→ Separated chromosomes move towards opp. spindle poles thus, creating haploidy at each pole.